with equipment manufacturers, have developed and used for many years a system employing frequency offset. In clustering situations, the broadcasters mutually agree to shift their carrier positions by plus or minus 4.25 MHz, effectively putting an 8.5 MHz guard band between adjacent channels. That practice is used frequently, making more efficient use of the available spectrum. Before a reduction in band width to 16 MHz is mandated, the feasibility of continuing offset operation must be determined. Reduction of band width to 12 MHz eliminates any possibility of offset operation.

As recognized by COMSAT, reduction of channel band width to 12 MHz, dictates a requirement to employ digital systems. The present practice of using FM modulation of an analog system has no chance of viability. The digital system must be able to support the high data rates required to provide distribution quality. For the present system (NTSC) of television delivery, or its equivalent, the required data rate for distribution is 45 megabits per second (Mb/s). High definition television systems require far more data-handling capacity, estimated to be in the range of 320 to 760 Mb/s. Although 20 Mb/s is sufficient to broadcast the compressed high definition video with its associated sound and data, the degree and manner of compression ultimately found satisfactory for distribution is still not known. In any event, it will be substantially greater than the 20 Mb/s considered satisfactory for broadcast.

The propagation conditions under which ENG systems must operate dictate the use of the most robust of digital system modulation. Reduction to channel band width of 12

MHz thwarts that objective. Delivery of a high definition signal certainly would be precluded.

To work in the adverse propagation environment of ENG systems, the preferred modulation mode for a digital signal is Quadrature Phase Shift Keying ("QPSK"). But the transmission speed for QPSK is 1.9 bits/hertz. Assuming a frequency tolerance of 0.005%, as required in the 2 GHz band by the FCC, leaves 11.8 MHz of usable band width in a 12 MHz channel. The resulting transmission speed for the channel would be 22.4 Mb/s. That transmission speed requires an unacceptably high compression of the video/audio data stream. As indicated above, even "standard definition" television requires a digital data rate of 45 Mb/s. Furthermore, a substantial portion of the data stream must be devoted to error correction and concealment in order to maintain maximum feasible quality in the ENG propagation environment.

To achieve a data transmission speed of at least 45 megabits per second, the approximate minimum level for distribution purposes, a modulation mode such as 64-state quadrature amplitude modulation (64QAM) would be required. Although 64QAM might be quite satisfactory in the benign environment of a cable system, it is quite unsuitable in the high-loss, multipath environment of ENG systems.

Adjacent channel employment with systems in close proximity is essential to accommodate broadcast needs in congested situations. Twelve megahertz channel band width will not permit the use of offset to provide guard bands between channels. Sharp

cutoff filters introduce problems of intermodulation, limiting their effectiveness in avoiding spill into the adjacent channel. Although digital systems are more rugged than analog systems with respect to adjacent channel interference, much experimental work is required before the interference potential, and consequent channel availability can be determined.

COMSAT has addressed partly the easier problem of 16 MHz channel band width, but it has not addressed at all the consequences on the BAS of channel band width reduced to 12 MHz.

I declare under the penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on June 15, 1995.

Jules Cohen, P.E.

Exhibit B

Prepared for the
National Association
of Broadcasters
Washington, DC

Estimate of Relocation and Retrofit Costs for the 2 GHz Television Broadcast Auxiliary Band in Order to Accommodate MSS

June 19, 1995

HAMMETT & EDISON, INC.
CONSULTING ENGINEERS
SAN FRANCISCO

National Association of Broadcasters, Inc. • 2 GHz Relocation Costs Estimate

Statement of Dane E. Ericksen, Consulting Engineer

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained by the National Association of Broadcasters to review the costs estimated by Motorola, Inc., in its comments to ET Docket 95-18, concerning the Mobile Satellite Service, for relocating Television Broadcast Auxiliary stations out of Television Broadcast Auxiliary Channels A1 (1,990–2,008 MHz) and A2 (2,008–2,025 MHz).

Cost of Relocating 2 GHz Television Broadcast Auxiliary Stations

1. Motorola, Inc. ("Motorola") retained Carl T. Jones Corporation ("Jones") to estimate the costs of relocating 2 GHz Television Broadcast Auxiliary stations to the 7 and 13 GHz Television Broadcast Auxiliary bands, in order to make 2 GHz spectrum available for use for the Mobile Satellite Service ("MSS"). For the reasons given below, it is my opinion that the Jones study underestimated the *overall* cost. The actual overall cost is really $171 million.

Inaccurate FCC Broadcast Auxiliary Database

2. The Jones study based its cost estimate on an analysis of the FCC database. However, it is my belief that there are significant inaccuracies in the Commission's Broadcast Auxiliary database, for the following reasons:

   2.1 Older Broadcast Auxiliary licenses are unlikely to be in the Commission's database. Because older Broadcast Auxiliary licenses were hand-typed rather than computer-generated, such older authorizations generally do not show up in the Commission's computerized database.

   2.2 Since about 1985, when the FCC transferred its Broadcast Auxiliary database from an older computer system to a newer computer system, rumors have circulated that two of seven magnetic media tapes containing data on Broadcast Auxiliary stations were lost, causing many Broadcast Auxiliary stations not to appear in the present database.

   2.3 The questionable accuracy of the FCC Broadcast Auxiliary database is buttressed by a 1991 request from the FCC's Office of Engineering and Technology ("OET") to the Society of Broadcast Engineers, Inc. ("SBE"), for copies of the 2 GHz Television Broadcast Auxiliary databases maintained by the approximately 125 SBE-sponsored volunteer frequency coordinators. Unfortunately, due to funding limitations, the SBE was unable to accommodate the OET request unless it was

reimbursed $5,000 to offset the expenses that it would incur in responding to the OET request. No such funding was available, and a centralized database compiled from over one hundred separately maintained volunteer frequency coordinator databases was never created. A copy of an April 11, 1991, letter from the SBE to OET, responding to the OET request, is provided as Exhibit 1 to these comments.

2.4 Because of the conversion to blanket Broadcast Auxiliary license renewals around 1980, many discontinued stations still show up in the Commission's database. Because broadcasters have voluntarily moved most fixed Television Broadcast Auxiliary links from the 2 GHz band to the 7 or 13 GHz bands, especially in the major markets, the failure to purge the database of abandoned 2 GHz band fixed link stations results in an overprediction of the number of fixed link 2 GHz Television Broadcast Auxiliary stations.

Better Estimate of 2 GHz Television Broadcast Auxiliary Stations

3. The Jones study estimated that there are 2,586 fixed stations (STLs and TV Relays) and 1,420 mobile (TV Pickup) stations in the 2 GHz Television Broadcast Auxiliary band. This is inconsistent with my understanding of the 2 GHz Television Broadcast Auxiliary band, which is that the bulk of 2 GHz Television Broadcast Auxiliary stations are mobile and portable TV Pickup stations, rather than fixed STL or TV Relay stations.

4. My understanding is consistent with the numbers provided in OET Report Number TS 92-1, "Creating New Technology Bands for Emerging Telecommunications Technology," published in January 1992. At Section 3.3.2 of that report, OET concluded that the 2 GHz Television Broadcast Auxiliary band supported "approximately 2,000 fixed and 5,500 mobile facilities." That is, a ratio of almost three to one of mobile transmitters to fixed transmitters. Because of the previously described problems with the Commission's Broadcast Auxiliary database, these OET derived numbers, are, as described, also estimates. However, I believe them to be more accurate than the Jones report numbers, which are derived from a flawed database.

5. Whereas a station authorization for a fixed Television Broadcast Auxiliary facility involves only one transmitter and generally only one receiver, TV Pickup authorizations generally authorize multiple transmitters. Based on a 1995 survey done by the National Association of Broadcasters ("NAB"), the average number of transmitters per TV Pickup station license is 1.7 electronic news gathering ("ENG") transmitters and 1.5 portable ("Tripod to

Van") transmitters. The Jones study also relied on these figures. The number of TV Pickup licenses can therefore be estimated at 1,719 (*i.e.*, 5,500 divided by (1.5 + 1.7)).

6. A better estimate of the number of 2 GHz Television Broadcast Auxiliary transmitters and receivers would therefore be 2,000 fixed transmitters, 2,000 fixed receivers, 2,578 mobile transmitters (5,500 x (1.5/3.2)), 2,922 portable transmitters (5,500 x (1.7/3.2)), 2,579 portable receivers (1,719 TV Pickup stations times 1.5 portable (Tripod to Van) receivers per station), and 2,453 fixed ENG receivers[1] (749 commercial stations in the top 100 markets[2] times an estimated 3.2[3] remote ENG receive sites per station). Of the fixed link stations, two-sevenths, or 571, can be estimated to be operating on Channels A1 or A2, assuming an equal distribution (channel loading) for the fixed link stations.

Some Fixed Station Cost Estimates Are Too Low

7. Some of the costs shown in Appendix A to the Jones report are, in my opinion, too low. My estimate of those costs are as follows:

7.1 Fixed (rack mounted) 7 GHz transmitter: The Jones study assumed a cost of $10,745. This is consistent with current-day cost estimates recently obtained from a major supplier of Television Broadcast Auxiliary equipment, so the Jones study figure will be used.

7.2 7 GHz transmission line and connectors: The Jones study assumed 100 feet of elliptical waveguide at the transmit end, and 400 feet of elliptical waveguide at the receive end, at $15.91 per foot, plus two pairs of connectors at $580 per pair. These figures are reasonable and have been used in my estimates.

7.3 Fixed 7 GHz transmitting and receiving antennas: The Jones study assumed a cost of $2,220 each for antennas, which implies use of only 6-foot diameter Category B antennas. It is my opinion that only 8-foot diameter Category A antennas should be considered, to eliminate the possibility of being forced to upgrade to Category A by a newcomer station at some future date. A broadcaster installing only a Category B antenna now, the cost of which would presumably be funded by the benefiting MSS

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[1] These are typically unattended, remotely controlled steerable receiving antennas located on tall buildings or mountain tops. The incoming ENG signal is then relayed to the station's studio either by a fixed, point-to-point TV Relay station or, in some cases, by hard-wired coaxial or fiber optic cables.

[2] 1995 TV Factbook, at Page C-34.

[3] 1995 NAB "2 GHz TV Auxiliary Facilities Survey," Table 3, shows an average of 3.7 2 GHz receivers installed at fixed locations for top-50 market stations, and an average of 2.6 2 GHz receivers installed at fixed locations for 51-100 market stations, for a combined average of 3.2 fixed receivers per top-100 market stations.

entity, would probably be stuck with the full cost of subsequently upgrading to Category A antennas at a future date. Therefore, the minimum transmitting and receiving antenna costs should be $2,910 each rather than $2,220 each. Further, unlike the case for the 2 GHz Television Broadcast Auxiliary band, the 7 GHz Television Broadcast Auxiliary band is heavily loaded with existing fixed paths. Any newcomer station would be likely to have to use at least one high-performance antenna in order to frequency coordinate the new path. The cost of a 7 GHz, 8-foot high performance antenna is $8,260. Therefore, a more realistic transmitting and receiving antenna cost for a new 7 GHz station is $11,170 per antenna pair, assuming one standard antenna and one high performance antenna, rather than $4,440 per pair.

7.4 Fixed (rack mounted) 7 GHz receiver: The Jones study showed a cost of $8,495 per receiver. A more realistic cost would be $11,000 based on my discussions with a major supplier of Television Broadcast Auxiliary equipment.

7.5 7 GHz FCC application and engineering: The Jones study estimated $3,000 for the cost of the FCC application and engineering. This is unrealistically low, because of the need for a frequency coordination study and, quite likely, a radio frequency radiation (RFR) study. A more realistic figure would be $6,000. An RFR study for the station will likely be required in order to obtain the approval of a local planning or zoning board, even though the FCC has categorically exempted Television Broadcast Auxiliary stations from having to routinely include an engineering statement addressing RFR issues. For example, in 1991, while preparing applications to relocate a 600-watt Class A noncommercial educational FM station and a 10-watt 950 MHz Aural STL station for a client in Berkeley, California, from Shattuck Avenue to Martin Luther King, Jr. Way, the local permitting board and concerned citizens focused far more attention on the exposure conditions from the 950 MHz "microwave" antenna than from the FM antenna, even though the FM transmitter had more than ten times the power of the microwave transmitter. In my opinion, budgeting $4,500 to cover the legal and engineering costs associated with environmental issues that now seem to be inevitably raised when new or replacement microwave stations are proposed is entirely reasonable.

7.6 7 GHz system installation: The Jones study assumed an installation cost of $6,000. Because of the assumption that one of the fixed link dishes would have to be a high-

performance antenna, a somewhat higher installation cost of $8,000 would be a better estimate.

7.7 Fixed (rack mounted) 13 GHz transmitter: The Jones study assumed a cost of $10,395. This is consistent with current-day cost estimates recently obtained from a major supplier of Television Broadcast Auxiliary equipment, so the Jones study figure will be used.

7.8 13 GHz transmission line and connectors: The Jones study assumed 100 feet of elliptical waveguide at the transmit end and 400 feet of elliptical waveguide at the receive end, at $12.79 per foot, plus two pairs of connectors at $580 per pair. These figures are reasonable and have been used in my estimates.

7.9 Fixed 13 GHz transmitting and receiving antennas: The Jones study assumed a cost of $2,180 each for antennas, which implies use of 6-foot diameter Category A antennas. However, unlike the case for the 2 GHz Television Broadcast Auxiliary band, the 13 GHz Television Broadcast Auxiliary band is heavily loaded with existing fixed paths. Any newcomer station would be likely to have to use at least one high-performance antenna in order to frequency coordinate the new path. The cost of a 13 GHz, 6-foot high performance antenna is $6,980. Therefore, a more realistic transmitting and receiving antenna cost for a new 13 GHz station is $9,160 per antenna pair, assuming one standard antenna and one high performance antenna, rather than $4,360 per pair.

7.8 Fixed (rack mounted) 13 GHz receiver: The Jones study showed a cost of $8,130 per receiver. A more realistic cost would be $10,500 based on my discussions with a major supplier of Television Broadcast Auxiliary equipment, so that higher figure will be used.

7.9 13 GHz FCC Application and Engineering: The Jones study estimated $3,500 for the cost of the FCC application and engineering. For the same reasons given in Item 7.5, a more realistic cost would be $6,000.

7.10 13 GHz System Installation: The Jones study assumed an installation cost of $6,000. Because of the assumption that one of the fixed link dishes would have to be a high-performance antenna, a somewhat higher installation cost of $8,000 would be a better estimate.

Some Mobile and Portable Station Cost Estimates Are Also Too Low

8. Some of the costs shown in Appendix B to the Jones report are, in my opinion, too low. My estimate of those costs are as follows:

8.1 2 GHz Mobile (ENG) Transmitter: The Jones study assumed a cost of $8,500. I agree with this as a reasonable cost for the basic transmitter, which would typically be frequency agile, have two audio subcarriers, and a 4-watt output. However, to this should be added $7,100 for a mast-mounted 10-watt power amplifier, for a total cost of $15,600 rather than $8,500.

8.2 Mobile Transmitting Antenna: The Jones study assumed that existing 2 GHz band mobile transmitting dishes, such as those typically used by ENG vans, could continue to be used in the upward-shifted band, as could the existing transmission line and connectors. While certainly the existing transmission lines and connectors could accommodate a 35 MHz upward shift, some stations will also require new transmitting antennas. This is because some ENG antennas are relatively narrowband "rod" or "helical" type antennas that are just able to meet their specifications at their current 1,990–2,110 MHz band edges. Shifting the band upwards by 35 MHz would require replacement antennas, either narrowband and optimized for 2,025–2,145 MHz, or broadband (and lower gain) aperture antennas. A cost estimate of $3,500 each for new transmitting antennas for the estimated percentage of transmitters with narrowband antennas is therefore included.

8.3 ENG Receive Only Antenna: The Jones study assumed that existing 2 GHz band ENG receive only antennas could continue to be used in the upward-shifted band. Since these antennas are typically broadband aperture type antennas, I agree that it should be possible to use the existing antennas. Therefore, no replacement cost has been allocated.

8.4 Portable Receive Antenna: The Jones study assumed that existing 2 GHz band portable (Tripod to Van) receiving antennas could continue to be used in the upward-shifted band. For the reasons given in Item 8.2, new receiving antennas, again designed to operate in the shifted band, would be required for some of the existing receivers. A cost estimate of $1,800 each for new receiving antennas for the estimated percentage of receivers with narrowband antennas is therefore included.

8.5 FCC Application & Engineering: Because a mobile or portable TV Pickup station, rather than a fixed link TV STL or TV Relay station is involved, budgeting only $1,500 for "FCC Application & Engineering" per station is reasonable.

8.6 System Installation: The Jones study assumed that there would be no installation costs. Since new transmitters and receivers will have to be substituted, a small installation cost will be incurred, even for mobile and portable equipment. An installation cost of $500 has therefore been assumed.

Net Relocation Costs Estimates

9. Having estimated the number of transmitters and receivers involved, and their respective costs, a spreadsheet program was then used to calculate the total relocation costs. The attached spreadsheet, Exhibit 2, shows the total estimated relocation/retrofit cost. I have assumed that the Channel A1 and A2 fixed link stations would be migrated equally to the 7 and 13 GHz Television Broadcast Auxiliary bands, and that the existing universe of 2 GHz TV Pickup transmitters and receivers would have to fit into the remaining 2 GHz Television Broadcast Auxiliary spectrum. It should be noted that *all* transmitters and receivers need to be replaced, and all antennas, to provide continued compatibility for the new 2 GHz channels (either because the synthesized front ends of the transmitters and receivers must now tune 2,025–2,145 MHz instead of 1,990–2,110 MHz, or because of narrowed channels, in the event that broadcasters are forced to accept a 35 MHz loss of 2 GHz spectrum). This estimate assumes that existing 2 GHz transmission lines and connectors can continue to be used.

10. Although another option would be to assume that two sevenths of the mobile and portable 2 GHz units would instead be migrated to the 7 and 13 GHz bands, this scenario is unrealistic, because such an influx of TV Pickups would create an intolerable conflict with the fixed links that now populate the 7 and 13 GHz bands. Indeed, it is precisely because of the conflict between ENG mobiles and fixed link stations that broadcasters have voluntarily, and at considerable expense, migrated fixed links to the 7 and 13 GHz Television Broadcast Auxiliary bands, especially in the larger markets where ENG use is heaviest. Although there are TV Pickup stations now operating in the 7 and 13 GHz bands, the 7 GHz TV Pickups do not have anywhere near the freedom and flexibility that 2 GHz ENG TV Pickups now enjoy. TV Pickup stations in the 13 GHz band are primarily low power man-pack or Tripod to Van units, typically used within the confines of a sports

stadium or convention center, and thereby avoid the fundamental incompatibility that high powered and wide ranging 2 GHz ENG trucks have with fixed links in the same band.

Summary

11. The $45–$53 million cost estimate in the Jones study for relocating fixed link Television Broadcast Auxiliary stations on Channels A1 and A2 to the 7 or 13 GHz bands is too high, because the FCC database lists far more 2 GHz fixed link stations than are commonly believed to exist. A better estimate is $31 million. However, the Jones study understates the cost of replacing or retrofitting equipment used by TV Pickup stations, because the entire universe of stations must be modified, and not just those operating primarily on Channels A1 or A2, in order to maintain frequency agility and compatibility. A more realistic cost for retrofitting or replacing mobile and portable 2 GHz Television Broadcast Auxiliary equipment is therefore $140 million instead of $60 million, giving a grand total cost of $171 million instead of $105–$113 million. The Jones study assumption that hundreds of additional TV Pickup stations could operate in the 7 or 13 GHz Television Broadcast Auxiliary bands is unrealistic and therefore the cost estimates based on that scenario are irrelevant.

List of Figures

In carrying out these engineering studies, the following attached exhibits were prepared under my direct supervision:

1. Exhibit 1: Copy of April 11, 1991, SBE letter responding to OET request to confirm accuracy of its 2 GHz Television Broadcast Auxiliary database
2. Exhibit 2: Spreadsheet of total band relocation and retrofitting costs.

Dane E. Ericksen, P.E.

June 19, 1995

REGISTERED PROFESSIONAL ENGINEER
DANE E. ERICKSEN
No. 11654
Exp. 9-30-96
ELECTRICAL
STATE OF CALIFORNIA

Affidavit

State of California | ss:
County of Sonoma |

Dane E. Ericksen, being first duly sworn upon oath, deposes and says:

1. That he is a qualified Registered Professional Engineer, holds California Registration No. E-11654 which expires on September 30, 1996, and is employed by the firm of Hammett & Edison, Inc., Consulting Engineers, with offices located near the city of San Francisco, California,

2. That he graduated from California State University, Chico, in 1970, with a Bachelor of Science Degree in Electrical Engineering, was an employee of the Field Operations Bureau of the Federal Communications Commission from 1970 to 1982, with specialization in the areas of FM and television broadcast stations and cable television systems, and has been associated with the firm of Hammett & Edison, Inc., since October 1982,

3. That the firm of Hammett & Edison, Inc., Consulting Engineers, has been retained by the National Association of Broadcasters to review the costs estimated by Motorola, Inc., in its comments to ET Docket 95-18, concerning the Mobile Satellite Service, for relocating Television Broadcast Auxiliary stations out of Television Broadcast Auxiliary Channels A1 (1,990–2,008 MHz) and A2 (2,008–2,025 MHz),

4. That such engineering work has been carried out by him or under his direction and that the results thereof are attached hereto and form a part of this affidavit, and

5. That the foregoing statement and the report regarding the aforementioned engineering work are true and correct of his own knowledge except such statements made therein on information and belief and, as to such statements, he believes them to be true.

Dane E. Ericksen, P.E.

Subscribed and sworn to before me this 19th day of June, 1995

CRS 2 JERI L. THOMSEN COMM. #1028103 NOTARY PUBLIC-CALIFORNIA SAN MATEO COUNTY My Comm. Expires May 29, 1998 CRS 2

SOCIETY OF BROADCAST ENGINEERS, INC. • P.O. Box 20450 • Indianapolis, Indiana 46220 (317) 842-0836

April 11, 1991

Mr. Donald D. Campbell
Office of Engineering and Technology
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Dear Mr. Campbell:

At the recent SBE Board meeting in Houston SBE Secretary Paul Lentz reported your request for assistance in verifying the accuracy of the Commission's Broadcast Auxiliary database for the 2 GHz portion of the TV Auxiliary band. As Chairman of the SBE's FCC Liaison Committee, the Board instructed that I respond to your request.

I regret to advise that the SBE is unable to accommodate your request that the Commission's entire 2 GHz Television Auxiliary database be verified. There are two practical reasons for this. One, we do not have the facilities to read the 7-inch magnetic tape media that you indicated is the format in which the database would be made available. Two, information on use of the 2 GHz band by individual TV stations is not maintained in a central SBE database, but rather is maintained separately by each of the approximately 125 SBE-affiliated frequency coordinating committees that now exist. To contact each of these volunteer frequency coordinating committees and cross-check the entire TV Auxiliary database, assuming the data had been converted to print or to an IBM PC or Macintosh compatible format, would represent a significant commitment of the SBE's finite resources.

For example, the cost to the SBE to fully participate in the Mass Media Docket 90-500 proceeding concerning frequency congested areas is now in excess of $3,000. This figure does not include the cost of SBE staff time or the fair market value of the time spent by SBE volunteers, who serve with no compensation. It represents the cost of printing and mailing first copies of the SBE's 83-page February 1990 Petition for Rulemaking, the SBE's November 1990 memo to all of its affiliated frequency coordinating committees, the cost of printing and distributing the SBE's 85-page initial comments, and the cost of printing and distributing the SBE's reply comments.

It appears that there are two underlying reasons for the Commission's desire to verify the accuracy of its 2 GHz TV Auxiliary database. The first reason appears to be to determine the number of existing stations that would have to be moved to some other microwave band in order to create a "spectrum reserve" for "emerging radio-based technologies", a move which the SBE will vigorously oppose. The second underlying

reason appears to be a desire to estimate the income which could be derived should the proposed $50 per year per Broadcast Auxiliary station "user's fee" become law. The SBE will also vigorously oppose that initiative, since in the case of Broadcast Auxiliary stations most of the coordination work is done for the Commission at no cost by volunteer frequency coordinating committees. The Commission then only needs to accomplish the relatively simple task of issuing a station authorization for the already-coordinated frequencies.

Nevertheless, the SBE agrees that any effort to improve the accuracy of the Commission's TV Auxiliary database is a worthwhile goal, regardless of the underlying motives. To that end, the SBE would be willing to undertake a best-effort cross-check of the FCC database if a grant in the amount of $5,000 could be made to the Society to at least cover its out-of-pocket expenses in converting the database to a format useable by its affiliated frequency coordinating committees, distributing that database to the committees, and paying the photocopying and postage costs incurred by the frequency coordinating committees in responding to the request. While we believe that the databases of SBE-affiliated frequency coordinating committees represent one of the most reliable and complete 2 GHz TV Auxiliary databases available, the SBE nevertheless cannot guarantee the accuracy of its databases. Any agreement between the FCC and the SBE would, therefore, have to recognize this caveat.

There are numerous reasons why the SBE would oppose any plan to re-allocate existing 2 GHz band TV Auxiliary licensees to some other microwave band, and oppose re-allocation to the 3,700-4,200 MHz domestic satellite band in particular. First, the SBE believes that interference would be caused to and received from existing fixed links in any microwave band which would be expected to accept the relocated TV Auxiliary stations. Second, any relocation to the domestic 4 GHz satellite band would be likely to cause interference to the large number of Television Receive Only (TVRO) facilities. While it is conceivable that interference could be avoided for relocated fixed links, although probably only by employing very costly ultra high performance shrouded antennas, there would be no practical way to avoid interference caused by mobile transmitters. Mobile transmitters in the 2 GHz TV Auxiliary band are now widely used for electronic news gathering (ENG) purposes. They provide TV stations with an effective means for exercising their First Amendment rights in covering news stories.

The SBE believes that any re-location of 2 GHz TV Auxiliary licensees would therefore require re-location to a dedicated band. The 7 GHz TV Auxiliary band, although a dedicated band, is far too saturated to absorb such an exodus. The 13 GHz TV Auxiliary band is shared with CARS stations, and is already heavily congested in most metropolitan areas. The 18 GHz TV Auxiliary band would not be suitable because it is shared with Common Carrier and Private Operational Fixed Service (POFS) users and because of the limited communications range at these frequencies. Only the existing 2 GHz TV Auxiliary band provides the necessary communications range needed for

effective ENG operations, with the important ability to still propagate through obstructing foliage.

Although fixed links do exist in the current 2 GHz TV Auxiliary band, they are in the minority because of a voluntary industry policy, encouraged by the SBE since the early 1980's, of reserving the 2 GHz TV Auxiliary band primarily for mobile ENG use. For example, in the Southern California area, there is now only one 2 GHz TV Auxiliary fixed link remaining. Where fixed links continue to exist, they generally preclude such ENG use.

TV stations have invested many tens of thousands of dollars in developing ENG systems in the 2 GHz band. The industry as a whole probably has an investment in 2 GHz ENG equipment in excess of $50,000,000. Any re-location to another band would, of course, represent a huge new expense for transmitters, receivers, and antennas. In addition, the current investment in 2 GHz ENG equipment would become worthless. The SBE questions the equity of expecting existing users, with a demonstrated need, to bear these costs in favor of creating a spectrum reserve for as some yet un-specified future service. The SBE believes that new service or services should first be specifically identified so their public interest benefits may be evaluated and compared to the public interest benefits of current band users.

Finally, the upcoming 1992 World Administrative Radio Conference (WARC-92), will be specifically looking at the 1-3 GHz band. Any consideration of changes to the U.S. 2 GHz TV Auxiliary band at this time would therefore be highly premature.

Sincerely,

Dane E. Ericksen
Chairman, SBE FCC Liaison Committee
Member, SBE Board

cc: Mr. Bradley L. Dick, SBE President
Mr. Richard Farquhar, SBE Vice President
Mr. Robert Goza, SBE Treasurer
Mr. Paul Lentz, SBE Secretary
SBE Board members
SBE FCC Liaison Committee members
Ms. Helen Pfeifer, SBE Executive Secretary
Mr. Steve Ingram, SBE Executive Director
Christopher D. Imlay, Esq. SBE Counsel

Fixed A1 & A2 stations Migrated to 7 GHz	
TX	$10,745
xmission line	$1,591
connectors	$580
TX & RX dishes	$11,170
xmission line	$6,364
connectors	$580
RX	$11,000
FCC app + engineering	$6,000
installation	$8,000
total cost per station	$56,030
number of stations	285
relocation cost	$15,968,550

Fixed A1 & A2 stations Migrated to 13 GHz	
TX	$10,395
xmission line	$1,279
connectors	$580
TX & RX dishes	$9,160
xmission line	$5,116
connectors	$580
RX	$10,500
FCC app + engineering	$6,000
installation	$8,000
total cost per station	$51,610
number of stations	285
relocation cost	$14,708,850

Replacement 2025-2145 MHz Mobile (ENG) Transmitters	
TX	$15,600
xmission line (UE)	$0
connectors (UE)	$0
TX dish	$3,500
FCC app + engineering	$1,500
installation	$500
percentage of TX with narrowband antennas	50%
number of TX	2,578
retrofit cost	$48,292,006

Replacement 2025-2145 MHz Portable (Tripod to Van) Transmitters	
TX	$8,500
xmission line (UE)	$0
connectors (UE)	$0
TX dish	$1,800
FCC app + engineering	$1,500
installation	$500
percentage of TX with narrowband antennas	80%
number of TX	2,922
retrofit cost	$33,427,680

Replacement Fixed 2025-2145 MHz ENG Receive Only Sites	
RX dish (UE)	$0
xmission line (UE)	$0
connectors (UE)	$0
RX	$10,500
FCC app + engineering	$0
installation	$500
total cost per ENG RX site	$11,000
number of RX sites	2,453
retrofit cost	$26,983,000

Replacement Portable 2025-2145 MHz Receivers	
RX dish	$3,500
RX	$11,500
percentage of RX with narrowband antennas	20%
number of RX	2,579
retrofit cost	$31,463,800

total fixed link A1 & A2 relocation costs	**$30,677,400**
total mobile/portable retrofit costs	**$140,166,486**
total retrofit/relocation costs	**$170,843,886**